

APPENDIX A

MDT Standards and Modifications

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MDT Standards and Modifications

Tables A-1 and A-2, taken from the MDT Design Standards manual, show the standard slopes for both rural and urban principal arterials.

Table A-1. MDT standard slope table for rural principal arterials.

Design Element		Design Criteria
Inslope		6:1 (with 3.0 m)
Ditch	Width	3.0 m minimum
	Slope	20:1 towards back slope
Back slope: cut depth at slope stake ^a	0 – 1.5 m	5:1
	1.5 m – 3.0 m	Rolling: 4:1
	3.0 m – 4.5 m	Rolling: 3:1
	4.5 m – 6.0 m	Rolling: 2:1
	> 6.0 m	1.5:1
Full height at slope stake ^b	0 – 3.0 m	6:1
	3.0 m – 6.0 m	4:1
	6.0 m – 9.0 m	3:1
	> 9.0 m	2:1

^a Cut slope (rock) – the back slope through rock cut sections will be determined by the geotechnical section based on its field investigation. At a maximum, the back slope typically will not exceed 0.25:1. For large cuts, benching of the back slope may be required.

^b Fill slope (rock) – in rock fills over 3.0 m high, the typical fill slope is 1.5:1. In rock fills greater than or equal to 3.0 m, the typical slope is 6:1.

Table A-2. MDT standard slope table for urban principal arterials.

Design Element		2-lane		Multi-lane	
		Curbed	Uncurbed	Curbed	Uncurbed
Inslope		N/A	6:1	N/A	6:1
Ditch	Width	N/A	3.0 m minimum	N/A	3.0 m minimum
	Slope	N/A	20:1 towards back slope	N/A	20:1 towards back slope
Back slope: cut depth at slope stake ^a	0 – 1.5 m	As flat as practical	5:1	As flat as practical	5:1
	1.5 m – 3.0 m		Rolling: 4:1		3:1
	3.0 m – 4.5 m		Rolling: 3:1		2:1
	4.5 m – 6.0 m		Rolling: 2:1		1.5:1
	> 6.0 m		1.5:1		1.5:1
Full height at slope stake ^b	0 – 3.0 m	As flat as practical	6:1	As flat as practical	6:1
	3.0 m – 6.0 m		4:1		4:1
	6.0 m – 9.0 m		3:1		3:1
	> 9.0 m		2:1		2:1

^a Cut slope (rock) – for curbed sections, see the typical section figures in section 11.7 of the MDT design manual. The back slope through rock cut sections will be determined by the geotechnical section based on its field investigation. At a maximum, the back slope typically will not exceed 0.25:1. For large cuts, benching of the back slope may be required.

^b Fill slope (rock) – for curbed sections, see the typical section figures in section 11.7 of the MDT Design Manual in rock fills over 3.0 m high, the typical fill slope is 1.5:1. In rock fills greater than or equal to 3.0 m, the typical slope is 6:1.

Table A-3 lists the areas between Dublin Gulch Road/Red Horn Road (reference post 37.1) and Little Marten Road/Timber Lane Road (reference post 46) where the default MDT standard slopes have been modified to a steeper slope. This applies to both cut and fill slopes. On cut slopes, the MDT-standard 3.0-meter (10-foot) flat bottom ditch is used in the cross sections. This change constitutes a deviation from standards for mitigation of impacts to class I and II wetlands, 4(f) lands, and Tribal trust lands dedicated to wildlife habitat management. Approximate locations where commitments were made in the preliminary design to steepen slopes are shown. These preliminary measures will be carried forward into final design where it is determined to be practicable and feasible and safety is not compromised. Actual avoidance and minimization measures will be determined during the final design process and may include additional measures at these locations as well as at other locations.

Table A-3. Locations of proposed slope modifications in the US 93 Ninepipe/Ronan improvement project preliminary design.

Approximate Reference Posts		Left/Right	Location	Modification	
From	To			Changed from	Changed to
37.19	37.26	RT (east)	Wetlands	Min. of 6:1	Min. of 4:1
37.24	37.26	LT (west)	Wetlands	Min. of 6:1	Min. of 4:1
37.35	38.08	LT (west)	Wetlands / Post Creek / Tribal Trust Land	Min. of 6:1	Min. of 4:1
37.62	38.09	RT (east)	Wetlands / Post Creek / Tribal Trust Land	Min. of 6:1	Min. of 4:1
39.53	42.04	LT (west)	4(f) / Ninepipe Reservoir / Wetlands / Tribal Trust Land	Min. of 6:1	Min. of 4:1
39.87	40.88	RT (east)	4(f) / Ninepipe Reservoir / Wetlands	Min. of 6:1	Min. of 4:1
40.88	41.13	RT (east)	Ninepipes Lodge	Min. of 6:1	Wall
41.67	41.76	RT/LT	4(f) / Wetlands	Min. of 6:1	Wall
41.13	42.04	RT (east)	4(f) / Wetlands	Min. of 6:1	Min. of 4:1
42.21	44.05	RT (east)	4(f) / Wetlands / Tribal Trust Land	Min. of 6:1	Min. of 4:1
42.46	42.56	RT/LT	4(f) / Wetlands	Min. of 6:1	Wall
42.31	43.20	LT (west)	4(f)	Min. of 6:1	Min. of 4:1
43.31	43.75	LT (west)	4(f)	Min. of 6:1	Min. of 4:1
43.81	44.20	LT (west)	Crow Creek / Wetlands	Min. of 6:1	Min. of 4:1
44.07	44.20	RT (east)	Crow Creek / Wetlands	Min. of 6:1	Min. of 4:1
44.32	44.56	LT (west)	Tribal Trust Land	Min. of 6:1	Min. of 4:1